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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/735,707
Filing Date: December 16, 2003
Appellant(s): PETTIT, JOHN W.

Michael C. Greenbaum
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 27, 2007, appealing from the Office action mailed April 19, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 6,377,652	Sturm	04-2002
US 6,456,691	Takahashi et al.	09-2002
US 4,047,029	Allport	09-1977
US 6,178,226	Hell et al.	01-2001
US 2002/0150209	Yokhin	10-2002
US 6,442,233	Grodzins et al.	08-2002
US 4,152,591	Averitt et al.	05-1979
US 2002/0141535	Torai et al.	10-2002
US 2,798,177	Wideroe	07-1957
US 5,598,451	Ohno et al.	01-1997
US 5,280,513	Meltzer	01-1994
US 6,252,930	MacKenzie	06-2001
US 2004/0218714	Faust	11-2004
US 5,410,575	Uhm	04-1995
US 5,430,787	Norton	07-1995
US 5,202,932	Cambier et al.	04-1993

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 2, 9, 11, 12, 33, 40, 42-46, and 95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturm (US Patent 6377652) in view of Takahashi et al. (US Patent 6456691).

2. Regarding claims 1 and 95, Sturm discloses an apparatus and method comprising a radiation source for generating a beam of radiation (fig. 1, #10), and a solid state detector (col. 4, lines 40-41), disposed to intercept the beam of radiation (fig. 1, #44b) after the beam of radiation (fig. 1, #441) has been made incident on an object (fig. 1, #16), for detecting the beam of radiation and for outputting a signal (fig. 1, signal to #37) representing the beam of radiation.

However, Sturm does not disclose a cold cathode, comprising a carbon nanotube material, for emitting electrons and a target, in a path of the electrons emitted by the cold cathode, for emitting a beam of radiation when struck by the electrons, the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized.

Takahashi et al. teaches a cold cathode, comprising a carbon nanotube material (abstract, lines 1-4), for emitting electrons (col. 4, line 2) and a target (fig. 1, #16), in a path of the

electrons emitted by the cold cathode (fig. 1, #14), for emitting a beam of radiation when struck by the electrons (col. 4, lines 6-9), the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is necessarily stabilized (col. 4, lines 50-53, and col. 5, lines 8-14).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Sturm with the cold cathode generator of Takahashi et al., since one would be motivated to make such a modification to reduce power (col. 1, lines 22-45, and col. 2, lines 5-10) as implied from Takahashi et al.

3. Regarding claims 2 and 33, Sturm further discloses a computing device (fig. 1, #40) for receiving the signal (fig 1, signal from #37) and for calculating and outputting, in accordance with the signal, a numerical value representing a property (col. 9, lines 49-53) of the object (fig. 1, #16).

4. Regarding claims 9 and 40, Sturm further discloses wherein the radiation source (fig. 1, #10) and the detector (fig. 1, #22) are positioned relative to each other such that the detector (fig. 1, #22) receives the beam of radiation after the beam of radiation (fig. 1, #44b) has been transmitted through the object (fig. 1, #16).

5. Regarding claims 11 and 42, Sturm further discloses the radiation source (fig. 1, #14) and the detector (fig. 1, #24) positioned relative to each other such that the detector (fig. 1, #24)

receives the beam of radiation (fig. 1, #44b) after the beam of radiation would necessarily have been side-scattered through the object (fig. 1, #16), due to scattering effects.

6. Regarding claims 12 and 43, Sturm further discloses wherein the detector comprises a first detector (fig. 1, #22) which is positioned relative to the radiation source (fig. 1, #10) such that the first detector (fig. 1, #22) receives a first portion of the beam of radiation after the first portion of the beam of radiation (fig. 1, #44b) has been transmitted through the object (fig. 1, #16), and a second detector (fig. 1, #24) which is positioned relative to the radiation source (fig. 1, #10) such that the second detector (fig. 1, #24) receives a portion of the beam of radiation after the second portion of the beam of radiation (fig. 1, #44b) would necessarily have been side-scattered through the object (fig. 1, #16), due to scattering effects.

7. Regarding claims 44-46, Sturm further discloses wherein the object comprises a sheet material, wherein the sheet material comprises paper, and wherein the paper is cigarette paper (fig. 1, #16, and col. 1, lines 30-31).

8. Claims 3, 4, 10, 17, 20-24, 28, 34, 35, 41, 61-64, 68, 70, and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturm and Takahashi et al. as respectively applied to claims 1, 2, 13, and 33 above, and further in view of Allport (US Patent 4047029).

9. Regarding claims 10, 17, and 41, Sturm as modified above suggests an apparatus and method as recited above.

However, Sturm does not disclose a radiation source and detector positioned relative to each other such that the detector receives a beam of radiation after the beam of radiation has backscattered from the object.

Allport teaches a radiation source (fig. 1, #21) and detector (fig. 1, #25) positioned relative to each other such that the detector (fig. 1, #25) receives a beam of radiation after the beam of radiation has backscattered from the object (fig. 1, #13).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Sturm as modified above with the backscattering of Allport, since one would be motivated to make such a modification to reduce composition sensitivity issues (col. 2, lines 50-56, and col. 3, lines 10-15) as implied from Allport.

10. Regarding claims 20 and 61 and for purposes of being concise, Sturm as modified above suggests an apparatus and method as recited above.

However, Sturm does not disclose a roller assembly for moving a sheet of material such that a beam of radiation is incident on the sheet of material and such that the sheet of material moves past a source.

Allport teaches a roller assembly (fig. 1, to the left of #51) for moving a sheet of material (fig. 1, #13) such that a beam of radiation (fig. 1, from #21) is incident on the sheet of material (fig. 1, #13) and such that the sheet of material (fig. 1, #13) moves past a source (fig. 1, #21).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Sturm as modified above with the roller assembly of Allport, since one would be motivated to make such a modification to work faster (fig. 1) as implied from Allport.

11. Regarding claims 21 and 62, Sturm further discloses wherein the source (fig. 1, #10) and the detector (fig. 1, #22) are disposed to be on opposite sides of the sheet of material (fig. 1, #16), such that the beam of radiation (fig. 1, #44) is transmitted through the sheet of material (fig. 1, #16).

12. Regarding claim 22, Sturm further discloses a computing device (fig. 1, #40) for receiving the signal (fig 1, signal from #37) and for calculating and outputting, in accordance with the signal, a numerical value representing a property (col. 9, lines 49-53) of the object (fig. 1, #16).

13. Regarding claims 28 and 68, Sturm further discloses wherein the detector is a solid state detector (col. 4, lines 40-41).

14. Regarding claims 3, 4, 23, 24, 34, 35, 63, and 64, Sturm as modified above suggests an apparatus and method as recited above.

However, Sturm does not disclose calculating thickness or mass per unit area.

Allport teaches calculating thickness or mass per unit area (abstract, lines 1-4).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Sturm as modified above with the calculating of Allport, since one would be motivated to make such a modification for measuring faster (col. 1, lines 5-30) as implied from Allport.

15. Regarding claims 70 and 71, Sturm further discloses wherein the object comprises a sheet material, wherein the sheet material comprises paper, and wherein the paper is cigarette paper (fig. 1, #16, and col. 1, lines 30-31).

16. Claims 5-7, 13-16, 18, 19, 25-27, 36-38, 49-58, and 65-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturm, Takahashi et al., and Allport et al. as respectively applied to claims 2, 20, 33, and 61 above, and further in view of Hell et al. (US Patent 6178226).

17. Regarding claims 5, 6, 13, 14, 25, 26, 36, 37, 49, 50, 65, and 66 and for purposes of being concise, Sturm as modified above suggests an apparatus and method as recited above.

However, Sturm does not disclose wherein a computing device is connected to a radiation source to control the radiation source and is programmed to modulate a beam of radiation, wherein the computing device is programmed to modulate the beam of radiation and to analyze a signal, to achieve phase-locked detection.

Hell et al. teaches wherein a computing device is connected to a radiation source to control the radiation source and is programmed to modulate a beam of radiation (col. 3, lines 26-

29), wherein the computing device is programmed to modulate the beam of radiation and to analyze a signal, to achieve phase-locked detection (col. 3, line 23).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Sturm as modified above with the phase-locked detection of Hell et al., since one would be motivated to make such a modification for better synchronization and a better signal (col. 3, lines 5-30) as implied from Hell et al.

18. Regarding claims 7, 15, 27, 38, 51, and 67, Sturm further discloses wherein the beam of radiation comprises soft x-rays (col. 6, lines 1-25).

19. Regarding claims 16 and 52, Sturm further discloses wherein the radiation source (fig. 1, #10) and the detector (fig. 1, #22) are positioned relative to each other such that the detector (fig. 1, #22) receives the beam of radiation after the beam of radiation (fig. 1, #44b) has been transmitted through the object (fig. 1, #16).

20. Regarding claims 18 and 54, Sturm further discloses the radiation source (fig. 1, #14) and the detector (fig. 1, #24) positioned relative to each other such that the detector (fig. 1, #24) receives the beam of radiation (fig. 1, #44b) after the beam of radiation would necessarily have been side-scattered through the object (fig. 1, #16), due to scattering effects.

21. Regarding claims 19 and 55, Sturm further discloses wherein the detector comprises a first detector (fig. 1, #22) which is positioned relative to the radiation source (fig. 1, #10) such that the first detector (fig. 1, #22) receives a first portion of the beam of radiation after the first portion of the beam of radiation (fig. 1, #44b) has been transmitted through the object (fig. 1, #16), and a second detector (fig. 1, #24) which is positioned relative to the radiation source (fig. 1, #10) such that the second detector (fig. 1, #24) receives a portion of the beam of radiation after the second portion of the beam of radiation (fig. 1, #44b) would necessarily have been side-scattered through the object (fig. 1, #16), due to scattering effects.

22. Regarding claim 53, Sturm as modified above suggests a method as recited above.

However, Sturm does not disclose receiving a beam of radiation after the beam of radiation has been backscattered from an object.

Allport teaches receiving (fig. 1, with #25) a beam of radiation (fig. 1, from #21) after the beam of radiation has been backscattered from an object (fig. 1, #13).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the method of Sturm as modified above with the backscattering of Allport, since one would be motivated to make such a modification to reduce composition sensitivity issues (col. 2, lines 50-56, and col. 3, lines 10-15) as implied from Allport.

23. Regarding claims 56-58, Sturm further discloses wherein the object comprises a sheet material, wherein the sheet material comprises paper, and wherein the paper is cigarette paper (fig. 1, #16, and col. 1, lines 30-31).

24. Claims 8, 29, 39, and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturm, Takahashi et al., Allport et al., and Hell et al. as applied to claims 5, 28, 36, and 68 above, and further in view of Yokhin (US Patent Application Publication 2002/0150209).

Sturm as modified above suggests an apparatus and method as recited above.

However, Sturm does not disclose modulating a beam of radiation by turning the beam of radiation off and then on while an instrument operates, to determine, from a signal received while the beam of radiation is turned off, a leakage current of the detector, and to calibrate the detector in accordance with the leakage current.

Yokhin teaches modulating a beam of radiation by turning the beam of radiation off and then on while an instrument operates, to determine, from a signal received while the beam of radiation is turned off, a leakage current of the detector, and to calibrate the detector in accordance with the leakage current (paragraph 52).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Sturm as modified above with the leakage current calibration of Yokhin, since one would be motivated to make such a modification to obtain a more accurate signal without background noise (paragraph 52) as implied from Yokhin.

25. Claims 30, 31, 72, and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grodzins et al. (US Patent 6442233) in view of Takahashi et al.

26. Regarding claims 30 and 72, Grodzins et al. discloses an apparatus and method comprising a radiation source for generating a beam of radiation (fig. 2b, #10), a holder (fig. 2b, #18) for holding an object (fig. 2b, #24) in a path of the beam of radiation (fig. 2b, #10), and a detector (fig. 2b, #50), disposed to intercept the beam of radiation after the beam of radiation (fig. 2b, from #10) has been made incident on the object (fig. 2b, #24), for detecting the beam of radiation and for outputting a signal representing the beam of radiation (abstract).

However, Grodzins does not disclose a rod-shaped object, a cold cathode, comprising a carbon nanotube material, for emitting electrons, and a target, in a path of the electrons emitted by the cold cathode, for emitting a beam of radiation when struck by the electrons, the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized.

Takahashi et al. teaches a cold cathode, comprising a carbon nanotube material (abstract, lines 1-4), for emitting electrons (col. 4, line 2) and a target (fig. 1, #16), in a path of the electrons emitted by the cold cathode (fig. 1, #14), for emitting a beam of radiation when struck by the electrons (col. 4, lines 6-9), the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is necessarily stabilized (col. 4, lines 50-53, and col. 5, lines 8-15).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Grodzins et al. with the cold

cathode generator of Takahashi et al., since one would be motivated to make such a modification to reduce power (col. 1, lines 22-45, and col. 2, lines 5-10) as implied from Takahashi et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Grodzins et al. with a rod-shaped object, since such a modification would have only involved a mere change in the shape of a component, which would generally be recognized as being within the level of ordinary skill in the art. One would be motivated to make such a modification to inspect for contraband of any shape.

27. Regarding claims 31 and 73, Grodzins et al. further discloses wherein the detector comprises a first detector (fig. 2b, #50), which is positioned relative to the radiation source (fig. 2b, for #10) such that the first detector (fig. 2b, #50) receives a first portion of the beam of radiation after the first portion of the beam of radiation has been transmitted through the object (fig. 2b, #24), and a second detector (fig. 2b, #88), which is positioned relative to a radiation source (fig. 2b, for #10) such that the second detector (fig. 2b, #88) receives a second portion of the beam of radiation after the second portion of the beam of radiation has been side-scattered through the object (fig. 2b, #24).

28. Claims 32 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grodzins et al. and Takahashi et al. as applied to claims 31 and 72 above, and further in view of Averitt et al. (US Patent 4152591).

Grodzins et al. as modified above suggests an apparatus and method as recited above.

However, Grodzins et al. does not disclose solid state detectors.

Averitt et al. teaches solid state detectors (col. 1, lines 32-40).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Grodzins et al. as modified above with the solid state detectors of Averitt et al., since one would be motivated to make such a modification for making a device more compact (col. 1, lines 32-40) as implied from Averitt et al.

29. Claims 33, 47, 48, 72, and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torai et al. (US Patent Application Publication 2002/0141535) in view of Takahashi et al.

30. Regarding claims 33 and 72, Torai et al. discloses a method comprising generating a beam of radiation (fig. 1, from #20), causing the beam of radiation to be incident on an object (fig. 1, object in #11), detecting the beam of radiation using a solid-state detector (fig. 1, #30, and col. 4, lines 40-41) and outputting a signal, and performing a measurement on an object in accordance with the signal to determine a property of the object (paragraph 44).

However, Torai et al. does not disclose emitting electrons from a carbon nanotube material, causing the electrons to be incident on a target, emitting a beam of radiation from the target, and controlling the carbon nanotube material to emit the electrons such that the beam of radiation emitted by the target is stabilized.

Takahashi et al. teaches emitting electrons from a carbon nanotube material (abstract, lines 1-4), causing the electrons (col. 4, line 2) to be incident on a target (fig. 1, #16), emitting a

beam of radiation from the target (col. 4, lines 6-9), and controlling the carbon nanotube material to emit the electrons such that the beam of radiation emitted by the target is necessarily stabilized (col. 4, lines 50-53, and col. 5, lines 8-15).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Torai et al. with the carbon nanotube generator of Takahashi et al., since one would be motivated to make such a modification to reduce power (col. 1, lines 22-45, and col. 2, lines 5-10) as implied from Takahashi et al.

31. Regarding claims 47, 48, and 75, Torai et al. further discloses wherein the object comprises a rod, and wherein the rod is a cigarette rod (paragraph 1).

32. Claims 49, 59, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torai et al. in view of Takahashi et al. and Yokhin.

For purposes of being concise, Torai et al. as modified above suggests a method as recited above. Torai et al. further discloses wherein the object comprises a rod, and wherein the rod is a cigarette rod (paragraph 1).

However, Torai et al. does not disclose modulating a beam of radiation.

Yokhin teaches modulating a beam of radiation (paragraph 52).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Torai et al. as modified above with the modulating of Yokhin, since one would be motivated to make such a modification to obtain a more accurate signal without background noise (paragraph 52) as implied from Yokhin.

33. Claims 76-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wideröe (US Patent 2798177) in view of Takahashi et al.

34. Regarding claims 76 and 78, Wideröe discloses a method and device comprising emitting electrons from a cathode (col. 2, lines 25-30), and accelerating the electrons through magnetic induction to form a high-voltage electron beam (col. 1, lines 15-20).

However, Wideröe does not disclose emitting electrons from a carbon nanotube material, the carbon nanotube cathode being controlled to emit the electrons such that a high-voltage electron beam is stabilized.

Takahashi et al. teaches emitting electrons from a carbon nanotube material (abstract, lines 1-4), the carbon nanotube cathode being controlled to emit the electrons such that a high-voltage electron beam is stabilized (col. 4, lines 50-53, and col. 5, lines 8-15).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method and device of Wideröe with the carbon nanotube generator of Takahashi et al., since one would be motivated to make such a modification to reduce power (col. 1, lines 22-45, and col. 2, lines 5-10) as implied from Takahashi et al.

35. Regarding claims 77 and 79, Wideröe further discloses causing the electrons to enter a region of a magnetic field, and increasing the magnetic field to cause the electrons to gain energy (col. 1, lines 15-27).

36. Claims 80-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohno et al. (US Patent 5598451) in view of Takahashi et al.

37. Regarding claim 80, Ohno et al. discloses a method comprising emitting electrons, and causing the electrons to be incident on a target for emitting a beam of radiation when struck by the electrons (col. 2, lines 17-19), wherein the target or an intervening layer is selected to narrow a range of output energies of the beam of radiation (figs. 1-8).

However, Ohno et al. does not disclose emitting electrons from a cathode comprising carbon nanotube material, wherein the cathode is controlled to emit the electrons such that a beam of radiation emitted by a target is stabilized.

Takahashi et al. teaches emitting electrons from a cathode comprising carbon nanotube material (abstract, lines 1-4), wherein the cathode is controlled to emit the electrons such that a beam of radiation emitted by a target is necessarily stabilized (col. 4, lines 50-53, and col. 5, lines 8-15).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Ohno et al. with the carbon nanotube generator of Takahashi et al., since one would be motivated to make such a modification to reduce power (col. 1, lines 22-45, and col. 2, lines 5-10) as implied from Takahashi et al.

38. Regarding claims 81 and 82, Ohno et al. further discloses wherein the beam of radiation (fig. 10, #3b) is made incident on an object (fig. 10, object in #5) to make a stabilized

measurement of a characteristic of the object (fig. 9), and wherein the range of output energies is selected to select a fluorescence emission (col. 2, lines 53-60) of a material in the object (fig. 9).

39. Claims 80 and 83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meltzer (US Patent 5280513) in view of Takahashi et al.

Meltzer discloses a method comprising emitting a beam of radiation (fig. 3, #6), wherein a target or an intervening layer is selected to narrow a range of output energies of the beam of radiation (col. 6, lines 41-49), and wherein the beam of radiation (fig. 3, #6) is made incident on an object (fig. 3, #16), backscattered radiation (fig. 3, #7) from the object (fig. 3, #16) is detected (fig. 3, #9), and the range of output energies is used to distinguish the backscattered radiation from spurious radiation (col. 6, lines 41-49).

However, Meltzer does not disclose emitting electrons from a cathode comprising carbon nanotube material, wherein the cathode is controlled to emit the electrons such that a beam of radiation emitted by a target is stabilized.

Takahashi et al. teaches emitting electrons from a cathode comprising carbon nanotube material (abstract, lines 1-4), wherein the cathode is controlled to emit the electrons such that a beam of radiation emitted by a target is necessarily stabilized (col. 4, lines 50-53, and col. 5, lines 8-15).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Meltzer with the carbon nanotube generator of Takahashi et al., since one would be motivated to make such a modification to reduce power (col. 1, lines 22-45, and col. 2, lines 5-10) as implied from Takahashi et al.

40. Claims 84 and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meltzer and Takahashi et al. as applied to claim 83 above, and further in view of MacKenzie (US Patent 6252930).

Meltzer as modified above suggests a method as recited above.

However, Meltzer does not disclose wherein an object comprises a substrate with a coating on the substrate, wherein backscattered radiation from the object is detected to measure the coating, and wherein the coating comprises paint.

MacKenzie teaches wherein an object comprises a substrate with a coating on the substrate, wherein backscattered radiation (title) from the object is detected to measure the coating, and wherein the coating comprises paint (abstract, lines 6-7).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Meltzer as modified above with measuring of MacKenzie, since one would be motivated to make such a modification to reduce costs (col. 1, lines 32-42) as implied from MacKenzie.

41. Claims 86-89 are rejected under 35 U.S.C. 103(a) as being unpatentable over Faust (US Patent Application Publication 2004/0218714) in view of Takahashi et al. and Averitt.

42. Regarding claim 86, Faust discloses a method comprising generating a beam of radiation, causing the beam of radiation (fig. 1, #102) to be incident on an object (fig. 1, #105) to generate Compton backscattered radiation (fig. 1, #104, and paragraph 35), detecting the Compton

backscattered radiation (fig. 1, #104) using a detector and outputting a signal, and detecting the object in accordance with the signal.

However, Faust does not disclose emitting electrons from a carbon nanotube material, causing the electrons to be incident on a target and emitting a beam of radiation from the target, or a solid state detector, wherein the carbon nanotube material is controlled to emit the electrons such that the beam of radiation is stabilized.

Takahashi et al. teaches emitting electrons from a carbon nanotube material (abstract, lines 1-4), causing the electrons to be incident on a target (fig. 1, #16) and emitting a beam of radiation from the target (fig. 1, #16), wherein the carbon nanotube material is controlled to emit the electrons such that the beam of radiation is necessarily stabilized (col. 4, lines 50-53, and col. 5, lines 8-15). Averitt et al. teaches a solid state detector (col. 1, lines 32-40).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Faust with the carbon nanotube generator of Takahashi et al., since one would be motivated to make such a modification to reduce power (col. 1, lines 22-45, and col. 2, lines 5-10) as implied from Takahashi et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Faust with the solid state detector of Averitt et al., since one would be motivated to make such a modification for making a device more compact (col. 1, lines 32-40) as implied from Averitt et al.

43. Regarding claims 87-89, Faust would necessarily have detection in accordance with differences in atomic weights between a first and second material (paragraph 30), due to the

interaction of radiation with the materials, wherein the first material comprises an explosive material (paragraph 2, "APL"), and wherein the second material comprises soil (fig. 1, #107).

44. Claim 90 is rejected under 35 U.S.C. 103(a) as being unpatentable over Faust, Takahashi et al., and Averitt as applied to claim 88 above, and further in view of Uhm (US Patent 5410575).

Faust as modified above suggests a method as recited above.

However, Faust does not disclose wherein a second material comprises a sea bed.

Uhm teaches wherein a second material comprises a sea bed (fig. 1).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Faust as modified above with the sea bed detection of Uhm, since one would be motivated to make such a modification for better finding explosives underwater (col. 1, lines 5-10) as shown by Uhm to prevent harm.

45. Claims 91-93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Faust, Takahashi et al., and Averitt as applied to claim 87 above, and further in view of Norton (US Patent 5430787).

Faust as modified above suggests a method as recited above.

However, Faust does not disclose inspecting a first material comprising metal and a second material comprising cement, wherein an object is a reinforcing rod in a cement structure.

Norton teaches inspecting a first material comprising metal and a second material comprising cement, wherein an object is a reinforcing rod in a cement structure (col. 6, line 45).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Faust as modified above with cement structure inspection of Norton, since one would be motivated to make such a modification to better analyze a structure (fig. 1) as implied from Norton.

46. Claims 91 and 94 are rejected under 35 U.S.C. 103(a) as being unpatentable over Faust, Takahashi et al., and Averitt as applied to claim 87 above, and further in view of Cambier et al. (US Patent 5202932).

Faust as modified above suggests a method as recited above.

However, Faust does not disclose inspecting a first material comprising metal, and wherein an object is a metal shaving in a food product.

Cambier et al. teaches inspecting a first material comprising metal, and wherein an object is a metal shaving in a food product (col. 1, lines 20-30).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Faust as modified above with the metal shaving inspection of Cambier et al., since one would be motivated to make such a modification for more safety (col. 1, lines 20-42) as implied from Cambier et al.

(10) Response to Argument

Rebuttal to Argument A:

Regarding the ground of rejection A of claims 1, 2, 9, 11, 12, 33, 40, 42-46, and 95, Appellant argues that Takahashi et al. fails to teach that the control over the carbon nanotube

field emission can be used to stabilize the x-ray output beam (see Appeal Brief, second paragraph on page 14). The Examiner disagrees based on the following reason. Takahashi et al. teaches "control" (col. 2, lines 22-23) over the carbon nanotube (abstract, lines 1-4) field emission (col. 2, lines 20-36). Such "control" of the cathode will "stabilize" (col. 5, lines 8-15) the current (col. 5, lines 8-15) as shown by Takahashi et al. The amount of current controls the amount of electrons emitted from the cathode. Such electrons impact a target or anode, thereby producing an x-ray output beam. Because of this relationship, increasing or decreasing the current will correspondingly increase or decrease x-ray emissions. Therefore, controlling and stabilizing the current in Takahashi et al. (col. 5, lines 8-15) can and will stabilize the x-ray output beam.

In response to Appellant's argument (see Appeal Brief, second paragraph of page 14) that the references fail to show certain features of Appellant's invention, it is noted that the features upon which Appellant relies (i.e., "that this control can be made to be very rapid, at radio frequencies if desired, so that phase locked techniques can be employed if desired to further stabilize the measurement without sacrificing response time of the measurement") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Appellant further argues (see Appeal Brief, page 14, last sentence of the second paragraph) that Takahashi et al. does not teach the use of such a carbon nanotube cold cathode x-ray tube in any type of measuring device. However, this argument is not found to be persuasive by the Examiner for showing nonobviousness of the combination of references. Takahashi et al.

teaches using carbon nanotube cold cathodes to solve various problems caused by conventional x-ray sources (col. 1, lines 22-45; and col. 2, lines 6-10 and 37-52). Such advantages will be realized in whatever system the x-ray source of Takahashi et al. is employed in, such as the measuring device of Sturm. Therefore, in response to Appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to Appellant's further argument (see Appeal Brief, pg. 14, last paragraph) without evidence that the present claimed invention offers advantages which a person having ordinary skill in the art would not have appreciated from the references, such as improved ability to detect substances which could not be detected by the prior art, the fact that Appellant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Appellant further argues that the fixed voltages do not control or stabilize the current (see Appeal Brief, pg. 15, lines 11-12). The Examiner disagrees. According to Takahashi et al., "[t]o stabilize the tube current it is required to control ... potential ..." (col. 8, lines 8-15). Therefore, Takahashi et al. does teach stabilizing current. Furthermore, one controls the applied voltage to the cathode by "connecting" power (col. 4, lines 35-50), which a person skilled in the art would know how to do by using a switch for example. This, in effect, will regulate or "control" the current (col. 4, lines 35-50). Therefore, the Takahashi et al. reference is enabling to one skilled

in the art to control voltages (by connecting as disclosed in column 4, lines 35-50), which in turn will "control" and "stabilize" current (col. 8, lines 8-15), which will also stabilize the x-ray output beam as explained above. Therefore, Takahashi et al. does teach and enable one to control the cathode to emit electrons such that the beam of radiation is stabilized, which reads on the corresponding claim limitations.

In response to Appellant's additional argument that the references fail to show certain features of Appellant's invention (see Appeal Brief, pg. 15, second full paragraph), it is noted that the features upon which Appellant relies (i.e., that the "electrode potential must be dynamically changed according to the command of a feedback loop..." or a "control signal") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Rebuttal to Argument B:

Regarding the ground of rejection B of claims 3, 4, 10, 17, 20-24, 28, 34, 35, 41, 61-64, 68, 70, and 71, in response to Appellant's argument that the combination of Allport with Sturm and Takahashi et al. will be too complex, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Rebuttal to Argument C:

Regarding the ground of rejection C of claims 5-7, 13-16, 18, 19, 25-27, 36-38, 49-58, and 65-67, Appellant argues that the teachings of Hell et al. are incompatible with the teachings of Takahashi et al., since the teaching methods of Hell et al. are with regards to hot filaments. The Examiner disagrees. Hell et al. teaches that the methods are applicable to low-temperature field emitters (col. 1, line 28; and col. 2, lines 62-66), which are the same type of cathode emitters as the ones used in Takahashi et al. Therefore, these references are compatible.

Rebuttal to Argument E:

Regarding the ground of rejection E of claims 30, 31, 72, and 73, Appellant argues that Grodzins et al. teaches only an "inspection", not a measurement. The Examiner disagrees. Grodzins et al. does teach measurement (abstract, line 7, "measure").

Furthermore, in response to Appellant's argument (see Appeal Brief, pg. 19, lines 2-3) that the references fail to show certain features of Appellant's invention, it is noted that the features upon which Appellant relies (i.e., a weight or thickness measurement device) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Rebuttal to Arguments D and F-P:

Regarding the grounds of rejections D and F-P, Appellant did not separately argue the patentability of claims 8, 29, 32, 33, 39, 47-49, 59, 60, 69, 72, and 74-94. Therefore, these

claims stand rejected for the reasons set forth above and/or in the final Office action mailed April 19, 2006.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Conferees:

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